Process for hydrodynamic inclusion of a multitude of three-dimensional products of finite dimensions by water jets

It is known from WO 00/63479 to deposit three-dimensional goods such as also initial or intermediate products between two material webs such as nonwovens, to join the nonwovens by felting their fibres as a result of hydrodynamic needling, consolidating and thereby also include the goods.

As long as the consolidation process is to take place continuously over the length of the advancing sandwich web, regardless of whether the three-dimensional goods run parallel to the direction of transport of the material web or perpendicular thereto, there is no difference from the previously known consolidation method using needling according to US-A-3 508 308, for example. However, if the goods are of finite dimensions and are to be packed and fully sealed, the goods can only be consolidated or packed in partially over the surface using the previously known method with continuous water needling.

It is the object of the invention to find a method with which such finite goods such as pre-fabricated padding and/or absorbent inserts for nappies, wound dressings, compresses, cushions, possibly also plasters or similar finished products can be continuously packaged without the products inadmissibly losing any volume and the covering nonwovens becoming linked to the products during the packaging needling.

Starting from a method for hydrodynamic inclusion of a layer comprising a plurality of three-dimensional finite products of at least two, in some cases three or more nonwovens, tissue, possibly additional woven fabrics or knitted fabrics by means of liquid jets emerging continuously and uniformly over a working width from a nozzle bar, by spraying a liquid under pressure from fine

nozzle openings arranged in a row from at least one nozzle strip extending over the working width of at least one nozzle bar towards the material web which is moving ahead of the nozzle bar, the invention consists in the fact that a nonwoven which subsequently covers the middle layer is initially consolidated over the entire surface using water jets, the middle layer to be included, the finite three-dimensional material to be applied thereto, is laid on this consolidated nonwoven, these two layers are then covered with a further nonwoven which has been prefixed in the same way and everything together is again subject to hydrodynamic needling uniformly over the working width to join the two superimposed covering nonwovens together.

The desire to continuously package such products which are three-dimensional in height and have sensitive product characteristics is thereby met. The pre-fixed covering nonwovens have a density, bearing capacity and strength which does not disadvantageously influence the products after joining the covering nonwovens by means of hydrodynamic needling. The products can remain voluminous and in particular do not link to the surface of the nonwoven which has already consolidated in the structure of the nonwoven. It is particularly advantageous that the covering nonwovens have their own strength and do not nap when used, i.e. they have sufficient abrasion strength.

All this particularly applies if the prefixed nonwovens are provided with a perforated structure during consolidation, which is formed if the hydrodynamic consolidation is carried out with a hole spacing of 5-20 hpi in the nozzle strip and a water pressure of at least 100 bar. Good binding-in of the fibres of the covering nonwovens is thereby achieved. If these nonwovens prefixed in this way are placed one above the other and the products of finite dimensions are provided therebetween, and the nonwovens are further joined to form the final packaging of the products

preferably also using a nozzle bar having nozzle strips provided with 5-20 hpi holes and the water pressure is no higher than 200 bar, the fibres of the covering nonwovens then join together and become entangled in the areas around the products but the products remains substantially unchanged in volume and at least do not link to the nonwovens during the packaging water needling.